

## Introduction

- A career in law enforcement poses significant risks, especially when attempting to arrest a noncompliant offender (1, 2).
- The risks increase when an officer needs to control and detain offenders by themselves, as doing so is a leading cause of officer injury (1, 2).
- These risks include an offender attempting to rise from an instructed prone position to either evade arrest or to physically engage with an officer (3).
- Further research is needed to know which of these prone positions gives an officer the greatest advantage to these risks.

## Purpose

The purpose of this study was to investigate the time required of an 'offender' to stand and sprint when starting from four different prone positions.

## Methods

- Eleven female subjects (age:  $23 \pm 4$  years; ht:  $168 \pm 5.5$  cm; BM:  $69.5 \pm 13.8$  kg) volunteered to participate for this study.
- Participants performed a 10-minute self-selected warm-up, then completed a 10-meter (m) sprint from four different prone positions (Figure 1).
- The four positions are listed as follows: Hands Under Chest with Feet Turned Out (HUC, FTO), Hands Out with Feet Turned Out (HO, FTO), Hands Out with Feet Crossed (HO, FC), and Hands Out with Feet Crossed and Knees Bent (HO, FCKB).
- Each sprint was performed twice from each of the four prone positions facing toward (t) and away (a) from the starting point (16 total sprints).
- Once in position, participants were instructed to stand as quickly as possible and sprint through timing gates set at the point of standing, 2.5, 5, 7.5, and 10 meters.
- Descriptive statistics (Mean  $\pm$  SD) were used to show the average speed achieved through each timing gate.

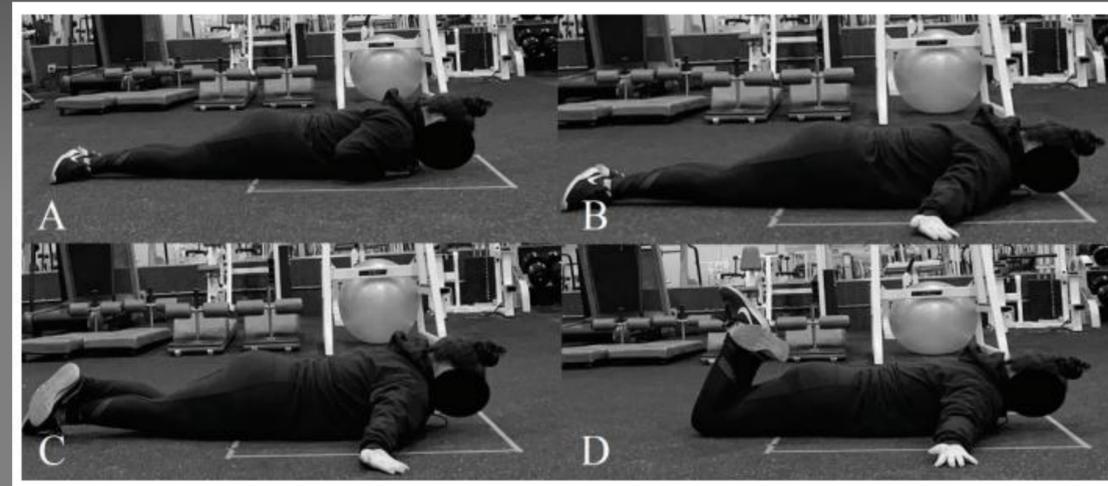


Figure 1. (A) Hands Under Chest, Feet Turned Out (HUC, FTO); (B) Hands Out, Feet Turned Out (HO, FTO); (C) Hands Out, Feet Crossed (HO, FC); (D) Hands Out, Feet Crossed, Knees Bent (HO, FC, KB)

The prone position of "Hands Out, Feet Crossed" (facing away from the starting point) demonstrated the slowest average time to stand and sprint in females, potentially giving police officers the greatest advantage to react.

Position	Standing (s)	2.5m (s)	5m (s)	7.5m (s)	10m (s)
HUC, FTO t	0.9 $\pm$ 0.294	1.8 $\pm$ 0.33	2.37 $\pm$ 0.311	2.85 $\pm$ 0.415	3.27 $\pm$ 0.414*
HO, FTO t	0.94 $\pm$ 0.286	1.84 $\pm$ 0.293	2.38 $\pm$ 0.324	2.85 $\pm$ 0.364	3.31 $\pm$ 0.412
HO, FC t	0.94 $\pm$ 0.222	1.86 $\pm$ 0.262	2.4 $\pm$ 0.289	2.87 $\pm$ 0.334	3.32 $\pm$ 0.37
HO, FC, KB t	1.04 $\pm$ 0.2	1.91 $\pm$ 0.294	2.48 $\pm$ 0.277	2.93 $\pm$ 0.347	3.41 $\pm$ 0.367
HUC, FTO a	1.21 $\pm$ 0.312	2.09 $\pm$ 0.369	2.65 $\pm$ 0.398	3.1 $\pm$ 0.443	3.56 $\pm$ 0.489
HO, FTO a	1.19 $\pm$ 0.353	2.1 $\pm$ 0.394	2.65 $\pm$ 0.423	3.13 $\pm$ 0.46	3.58 $\pm$ 0.506
HO, FC a	1.2 $\pm$ 0.302	2.1 $\pm$ 0.323	2.63 $\pm$ 0.393	3.14 $\pm$ 0.408	3.59 $\pm$ 0.452**
HO, FC, KB a	1.17 $\pm$ 0.292	2.08 $\pm$ 0.353	2.59 $\pm$ 0.404	3.12 $\pm$ 0.407	3.57 $\pm$ 0.46

Table 1. Female Descriptive Data (Mean  $\pm$  SD) for Standing, 2.5m, 5m, 7.5m, & 10m Sprint Time (s)  
\*Fastest overall 10m sprint time  
\*\*Slowest overall 10m sprint time

## Results

- Timing for each position is detailed in Tables 1.
- The fastest overall time to sprint 10m after standing from the prone position for females was observed with the HUC, FTO t position ( $3.27 \pm 0.414s$ ).
- The slowest overall time to sprint 10m after standing from the prone position was observed from the HO, FC a position ( $3.59 \pm 0.452s$ ).

## Conclusions

- This study gives insight of how fast a female offender could potentially react and sprint toward or away from an officer.
- The least effective position to stand and sprint is from the Hands Out with Feet Crossed and Knees Bent position.
- This suggests that this position could give police officers the best advantage of time to react to an offender.

## Practical Applications

- Understanding the time to sprint towards or away from an officer from various prone positions can enhance law enforcement training by improving an officer's ability to respond to the actions of an offender (4).
- This information helps increase the overall level of police officer and public safety in critical situations.

## References

1. Decker, A., Hilton, B., Dawes, J., Lockie, R., & Orr, R. M. (2022). Physiological demands of common occupational tasks among Australian police officers: A descriptive analysis. *Annals of Work Exposures and Health*, 66(7), 960-966.
2. Decker, A., Orr, R. M., Pope, R. R., & Hinton, B. (2016, November). Physiological demands of law enforcement occupational tasks in Australian police officers. In *ASCA National Conference on Applied Strength and Conditioning*.
3. McKinnon, C. D., Callaghan, J. P., & Dickerson, C. R. (2011). Field quantification of physical exposures of police officers in vehicle operation. *International journal of occupational safety and ergonomics*, 17(1), 61-68.
4. Sanchez, K., Dawes, J. J., Stephenson, M., Orr, R., & Lockie, R. (2023). Resisting arrest: Analysis of different prone body positions on time to stand and engage. *NBP-Journal of Criminalistics and Law*, 28(3), 37-48.

